

Effects of Riparian Zone Fragmentation on Primary Productivity and Fish Growth Rates

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STREAM HABITAT FRAGMENTATION

What is stream habitat fragmentation?

lack of connectivity between upstream and downstream populations

What causes fragmentation?

Human interference--agriculture, pollution, industry, forestry, erosion

Outcome of Fragmentation

- Less than 1% of original landscape remains in Illinois
- **Distinct patch formation may occur within a stream**

EFFECTS OF FRAGMENTATION

ABIOTIC

Increased amounts of sedimentation, siltation, chemical runoff, and pollution

Changes in dissolved oxygen, temperature, and pH

BIOTIC

Negative affects upon diversity, richness, mortality and reproductive success

Disruption of habitat equilibrium

SINCE

Stream Habitat Fragmentation can cause changes to in abiotic environment of a stream, one would also expect to see

- Changes in primary productivity which may lead to
- Changes in growth rates of fish at various trophic levels

OBJECTIVES

- * Determine if habitat fragmentation exists in stream environments
- * Discover if primary productivity is different between patches
- * Determine if growth rates of fish are affected by differences in primary productivity between patches
- * Observe the consistency of energy distribution between trophic levels in comparison to varied growth rates

Methods

Sites

7 sites were sampled for fish and productivity along Polecat Creek, a 4th order tributary of the Embarras River.

Reaches

Reaches were 300 ft and contained at least one riffle/pool sequence when possible.

Sampling techniques

Electroshock, collect, identify, and measure fish; choose fish for growth determination.

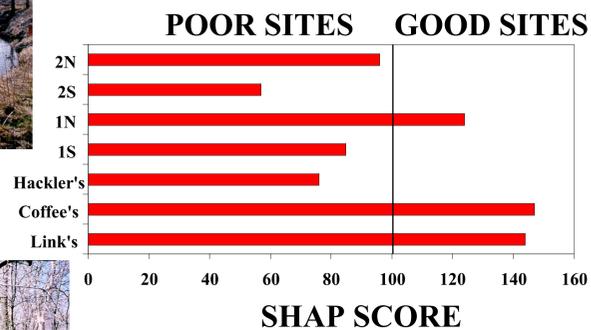
Results

Habitat Assessment

Used Stream Habitat Assessment Procedure (SHAP)

-Assessment based on 15 habitat metrics associated within the following three broad categories:

- substrate and instream cover
- channel hydrology and morphology
- riparian and bank features

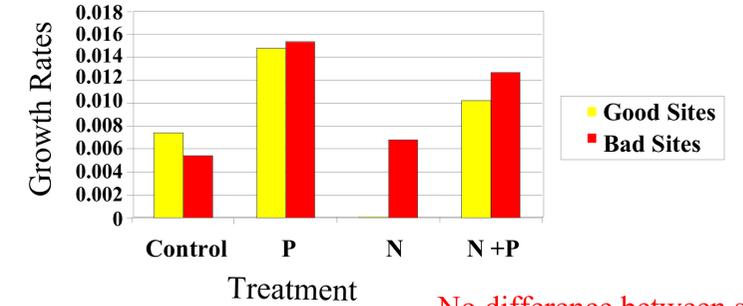


- Significant difference between sites (p<0.0001)

Productivity Assessment

Biostimulation technique

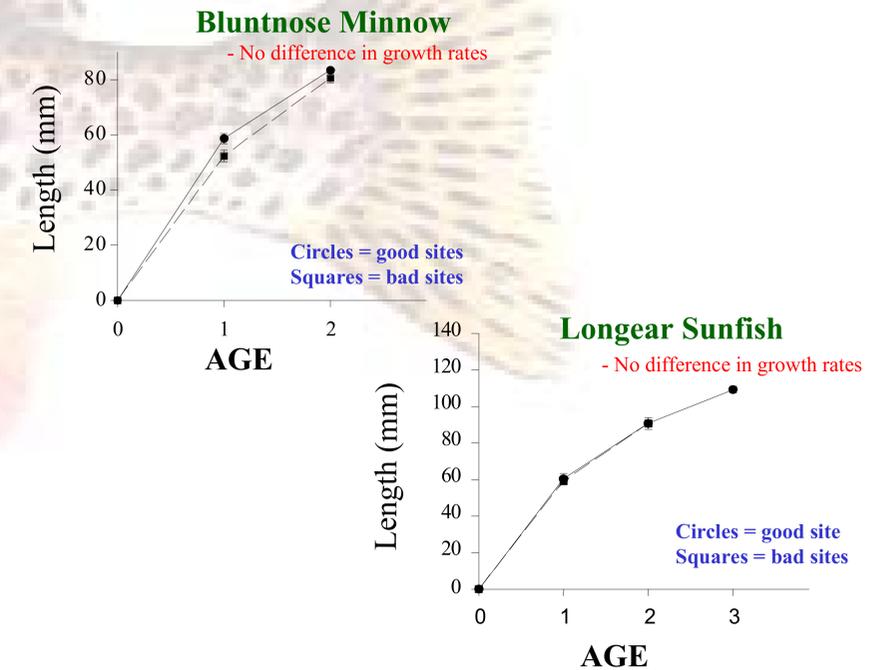
Test for the growth of *Selenastrum capricornutum* in the presence of turbidity



- No difference between sites

Growth Rate Determination

Determined using the back calculation technique



CONCLUSIONS

- *Distinct patches can be formed in stream habitats in response to land use.
- *All sites in Polecat Creek showed limited productivity due to nutrient deficiency
- *Additional productivity analysis showed phosphorus to be the limiting nutrient
- *Growth rates of fish at different trophic levels in each patch were not affected by productivity differences